DIAGNOSIS AND MANAGEMENT OF THE ADOLESCENT WITH AN ADNEXAL MASSES

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DISCLOSURES

• I HAVE NO FINANCIAL RELATIONSHIPS RELEVANT TO THIS EDUCATIONAL ACTIVITY.

• I HAVE BEEN WRONG ABOUT ADNEXAL MASS DIAGNOSES…
OBJECTIVES

AT THE END OF THIS SESSION, YOU SHOULD:

• BE FAMILIAR WITH COMMON PRE- AND POST-PUBERTAL ULTRASOUND FINDINGS.

• RECOGNIZE THE CLINICAL SIGNS AND ULTRASOUND FINDINGS OF OVARIAN AND TUBAL TORSION AND BE ABLE TIMELY MANAGE ADNEXAL TORSION IN AN ADOLESCENT.

• UNDERSTAND THE ULTRASOUND FINDINGS AND MANAGEMENT OF THE MOST COMMON ADNEXAL MASSES IN ADOLESCENT GIRLS.
CASE 1

• AN 11-YEAR-OLD GIRL PRESENTS TO HER PEDIATRICIAN WITH COMPLAINTS OF INTERMITTENT DIFFUSE ABDOMINAL PAIN. SHE HAS HAD BREAST DEVELOPMENT FOR 1 YEAR BUT NEVER HAD A MENSES.

• AN ULTRASOUND IS ORDERED AND SHOWS BILATERAL OVARIAN FOLLICLES WITH A DOMINANT 2 CM CYST ON THE LEFT, AND THE PEDIATRICIAN REFERS HER TO YOUR PRACTICE.

• DO YOU THINK THIS IS CAUSING HER PAIN? WHY DO YOU THINK SHE HAS A CYST?
GONADOTROPINS RISE AND CAN CAUSE PHYSIOLOGIC CYSTS IN THE FETUS, INFANT, AND PREMENARCHAL GIRL

GnRH neurons in olfactory placode migrate to arcuate nucleus

Hypothalamic GnRH stimulates FSH and LH release

Withdrawal of maternal and placental steroids causes pulsatile GnRH and rise in FSH and LH

Placental and maternal steroids provide negative feedback

Hypothalamic pulse generator is suppressed

Release of central inhibition of pulsatile GnRH
IMAGING

- ULTRASOUND IS THE MODALITY OF CHOICE FOR STUDYING PEDIATRIC AND ADOLESCENT GIRLS
- NO RADIATION EXPOSURE
- CAN BE DONE TRANS-ABDOMINALLY IN VIRGINAL PATIENTS THROUGH THE ACOUSTIC WINDOW OF A FULL BLADDER
- CT SCANS RARELY USED DUE TO IONIZING RADIATION
- MRI IS USEFUL FOR STRUCTURAL ABNORMALITIES
NORMAL UTERUS AND OVARY
5 YEAR OLD GIRL
NORMAL UTERUS 14-YEAR-OLD GIRL
FUNCTIONAL OVARIAN CYSTS IN REPRODUCTIVE AGE WOMEN

CASE 2 A

- An 11-year-old girl was referred by her pediatrician for evaluation of a 6 cm left adnexal cyst by ultrasound found for evaluation of pelvic pain.
- Repeat ultrasound in the office showed a persistent 6 cm cyst. Surgery was recommended.
- She had been asymptomatic at the time of the office visit, her insurance denied coverage of surgical excision.
ADNEXAL MASSES IN ADOLESCENT GIRLS

• MOST COMMON SYMPTOMS ARE ABDOMINAL PAIN
  • IRREGULAR MENSES ARE COMMON IN THIS AGE GROUP AND MAY OR MAY NOT BE RELATED TO THE CYST

• SIZE ≤ 8 CM, SIMPLE APPEARANCE ON SONO AND ABSENCE OF TUMOR MARKERS PREDICT BENIGN MASS

• MOST THAT ARE SURGICALLY REMOVED ARE BENIGN (90%). IN ORDER OF FREQUENCY:
  • SIMPLE CYSTS (E.G. PARATUBAL)
  • MATURE CYSTIC TERATOMAS
  • SEROUS CYSTADENOMAS
  • ENDOMETRIOMAS

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UTERUS AND LEFT OVARY
CASE 2 B

• SHE SUBSEQUENTLY PRESENTS TO 4 CENTRAL FLORIDA EDS IN 4 DAYS. ULTRASOUNDS ARE DONE EACH TIME. SHE IS FOUND TO HAVE A NORMAL LEFT OVARY AND NORMAL FLOW AND SENT HOME EACH TIME.

• SHE FINALLY PRESENTS TO OUR HOSPITAL, IS ADMITTED BY THE PEDIATRICS TEAM, AND THE GYN TEAM IS CALLED THE NEXT MORNING...
SIGNS AND SYMPTOMS OF OVARIAN TORSION

• SUDDEN-ONSET ABDOMINAL PAIN

• NAUSEA AND VOMITING (66% OF PATIENTS)

• USELESS TESTS
  • CBC
  • C-REACTIVE PROTEIN
  • ESR
UTERUS AND OVARIIES
LAPAROSCOPIC EXCISION OF PARATUBAL CYST AND DETORSION OF FALLOPIAN TUBE
PARATUBAL CYSTS

• ALSO CALLED PARAOVARIAN CYSTS OR HYDATID CYST OF MORGAGNI
• CAN BE FOUND INCIDENTALLY IN 3-4% OF WOMEN
• POSSIBLY HIGHER INCIDENCE IN PATIENTS WITH PCOS/HYPERANDROGENISM
• PROBABLY A DEVELOPMENTAL REMNANT
• IF LARGE, CAN CAUSE TORSION OF TUBE OR TUBE AND OVARY
• VERY IMPORTANT ON ULTRASOUND TO SEE IF THE CYST IS PART OF THE OVARY OR TO THE SIDE OF THE OVARY.
CASE 3

• 16-YEAR-OLD PRESENTS WITH COMPLAINTS OF RIGHT SIDED PAIN WITH RADIATION TO HER RIGHT GROIN

• PAIN IS DESCRIBED AS SQUEEZING IN NATURE

• SHE HAD A HISTORY OF A HEMORRHAGIC CORPUS LUTEUM CYST IN THE PAST AND A RIGHT PARATUBAL CYST THAT HAD BEEN MANAGED EXPECTANTLY

• ULTRASOUND WAS DONE AND SHOWED “A RIGHT OVARIAN CYST AND NORMAL BLOOD FLOW, RULING OUT TORSION”

• SHE WAS SENT HOME.

• SHE RETURNED TO THE ED 3 DAYS LATER WITH WORSE PAIN. NO FLOW WAS SEEN. SHE WAS TAKEN EMERGENTLY TO THE OR.
ULTRASOUND IMAGING AND TORSION

- Transabdominal ultrasonography is the imaging modality of choice in girls who are virginal.

- U/S has a sensitivity 92% specificity of 96% in detecting adnexal torsion.

- Ovaries that are torched are enlarged. A completely normal-appearing ovary on ultrasonography is unlikely to be twisted.

- Ultrasonography findings suggestive of ovarian torsion
  - Unilateral ovarian enlargement,
  - Ovarian edema: hyperchoegenic ovary with peripherally displaced follicles and echogenic stroma,
  - Free fluid,
  - Coiled vascular pedicle ("whirlpool sign")

“CLASSIC” APPEARANCE OF TORSION

Enlarged left ovary in midline
Peripheral follicles
Edema
RIGHT ADNEXA-1ST ED VISIT
RIGHT ADNEXA 3 DAYS LATER
AT SURGERY

What NOT to DO!!!
SO WHY DOPPLER?

• THE IMPORTANCE OF DOPPLER FLOW IS NOT AS AN INDICATOR FOR THE INITIAL DIAGNOSIS OF TORSION, BUT RATHER AS AN INDICATOR OF TIME UNTIL OVARIAN DEATH.

• 60% OF CASES WITH TORSION WILL SHOW BLOOD FLOW BY DOPPLER.

• IN A STUDY OF 521 PATIENTS HAVING SURGERY FOR AN ADNEXAL MASS, 48 WERE FOUND TO HAVE TORSION, WHEREAS THE ULTRASOUND DIAGNOSIS OF TORSION WAS MADE IN ONLY 12.

• IN OTHER WORDS, IF THERE IS DOPPLER FLOW, THEN THERE IS STILL TIME TO SALVAGE THE OVARY.

ACOG CO 783 ADNEXAL TORSION: KEY POINTS

• “THERE ARE NO CLINICAL OR IMAGING CRITERIA SUFFICIENT TO CONFIRM THE PREOPERATIVE DIAGNOSIS OF ADNEXAL TORSION.”

• TORSION IS A SURGICAL DIAGNOSIS

• TORSION IN PAG PATIENTS CAN OCCUR IN THE SETTING OF A NORMAL OVARY (UP TO ~50%).

• UNIQUE RISK FACTORS FOR TORSION IN PAG PATIENTS:
  • CONGENITALLY LONG OVARIAN LIGAMENTS,
  • EXCESSIVE LAXITY OF THE PELVIC LIGAMENTS,
  • RELATIVELY SMALL UTERUS THAT ALLOWS MORE SPACE FOR THE ADNEXA TO TWIST ON ITS AXIS
SURGICAL MANAGEMENT OF TORSION

- In the past the treatment was often oophorectomy, especially if the ovary appeared cyanotic.
  - Don’t do this in adolescents or young women!!
- Studies show that the ovary can be conserved, and simple detorsion performed, even in cases of grave ischemia
  - Meta-analysis of treatment of torsion 1984-2014
  - 92% had follicular activity after detorsion by follow-up ultrasound, even when the ovary appeared necrotic intraoperatively
  - No increase in morbidity noted
- Don’t be afraid to detorse and let edema reduce, then go back at a later date to remove a cyst.

CASE 4

• A 14 YEAR OLD PRESENTED TO HER PEDIATRICIAN FOR EVALUATION OF IRREGULAR MENSES

• AN ULTRASOUND WAS DONE THAT SHOWED A 9 CM COMPLEX LEFT ADNEXAL MASS.

• TUMOR MARKERS WERE DONE AND WERE NEGATIVE.
A recent case in a 12 year old


SAME PATHOLOGY, DIFFERENT APPEARANCES
SURGICAL FINDINGS
KEY POINTS ABOUT MATURE CYSTIC TERATOMAS

• CELL OF ORIGIN: GERM CELL (EMBRYONIC-CONTAINS MULTIPLE LAYERS-ECTODERM, ENDODERM, MESODERM). REPRESENT FIRST MEIOTIC DIVISION TOWARD FETAL TISSUE.

• 15% BILATERAL

• USUALLY ARE SLOW GROWING AND CAN BE MANAGED EXPECTANTLY IF LESS THAN 5CM AND ASYMPTOMATIC.

• CYSTECTOMY IS TREATMENT OF CHOICE: LAPAROSCOPY VS LAPAROTOMY
  • MYTH RE SPILL OF TERATOMA...
  • ULTRASOUND FOLLOW-UP FOR RECURRENCE

CASE 5

• 14-YEAR-OLD WAS TRANSFERRED EMERGENTLY FOR 5-DAY HISTORY OF PELVIC PAIN, MANAGEMENT OF A LARGE HEMATOCOLPOS, AND A RIGHT OVARIAN MASS WITH SUSPECTED TORSION

• MENARCHE HAD OCCURRED AT 11 YEARS OF AGE

• IMAGES SHOWED A VERY LARGE HEMATOCOLPOS, ABSENT LEFT KIDNEY, UTERINE DIDELPHYS, AND AN ENLARGED RIGHT OVARY WITH SUSPECTED TORSION
WORKING DIAGNOSIS

• OHVIRA
• RIGHT OVARIAN TORSION
FINAL PATHOLOGY AND MANAGEMENT

• HIGH GRADE B CELL LYMPHOMA WITH PLASMABLASTIC FEATURES

• PORT PLACED, BONE MARROW AND CSF NEGATIVE FOR TUMOR

• STARTING CHEMOTHERAPY WITH DOXORUBICIN, VINCRIStINE, ETOPOSIDE AND CYCLOPHOSPHAMIDE
RISK OF OVARIAN CANCER IN PAG PATIENTS

- RISK OF OVARIAN CANCER IN PEDIATRIC POPULATION IS VERY SMALL
  - 1/1MILLION <AGE 9
  - 1/100,000 AGE 10-19 YEARS
  - 91% ARE CURED

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GERM CELL TUMORS ARE MOST COMMON OVARIAN TUMOR IN THE PEDIATRIC ADOLESCENT POPULATION

Primordial Germ Cell

Differentiation suppressed
- Dysgerminoma
  - AFP-, hCG -, LDH+

Differentiation
- Embryonal carcinoma
  - AFP+, hCG +/-

Extraembryonic
- Trophoblast
  - Choriocarcinoma
    - AFP-, hCG +
- Yolk sac
  - Endodermal sinus tumor
    - AFP+, hCG -

Embryonic
- Teratoma
  - Mature teratoma
    - AFP-, hCG-
  - Immature teratoma
    - AFP +/-, hCG -
STROMAL TUMORS CAN PRESENT WITH PRECOCIOUS PUBERTY OR IRREGULAR MENSES

- JUVENILE GRANULOSA CELL TUMORS
  - SECRETE ESTROGEN AND PRESENT WITH BREAST ENLARGEMENT AND VAGINAL BLEEDING
  - TUMOR MARKERS: INHIBIN AND ESTRADIOL
  - PROGNOSIS IS EXCELLENT

- THECAL CELL TUMORS
  - PRODUCE ANDROGENS AND PRESENT WITH VIRILIZATION
  - TESTOSTERONE IS TUMOR MARKER
SURGICAL MANAGEMENT OF SUSPECTED OVARIAN MALIGNANCIES IN THE PEDIATRIC ADOLESCENT POPULATION

- PRE-OPERATIVE TUMOR MARKERS
  - AFP, LDH, HCG, INHIBIN, CA-125, ESTRADIOL AND TESTOSTERONE
  - EPITHELIAL CANCERS ARE RARE IN THIS POPULATION

- SOLID PELVIC MASSES SHOULD BE CONSIDERED MALIGNANT
  - DYSGERMINOMA, NEUROBLASTOMA, WILMS TUMOR, RHABDOMYOSARCOMA, LYMPHOMA, LEUKEMIA
  - CONSIDER MRI TO EVALUATE FOR METASTASES

- CONSERVATIVE APPROACH WITH UNILATERAL SALPINGO-OOPHORECTOMY AND STAGING IS APPROPRIATE.
  - CYSTECTOMY IS NOT APPROPRIATE IF MALIGNANCY SUSPECTED. CONSIDER INTRAOPERATIVE FROZEN SECTION IF UNCERTAIN.
KEY POINTS TO REMEMBER

• BE REASSURING- OVER 90% OF OVARIAN MASSES THAT GO TO SURGERY ARE BENIGN. MOST THAT ARE FUNCTIONAL DON’T GO TO SURGERY!

• BLOOD FLOW TO THE OVARY ON ULTRASOUND DOES NOT RULE OUT TORSION. IT MEANS THERE IS TIME TO SAVE AN OVARY!

• DETORSE THE OVARY AND AVOID OOPHORECTOMY UNLESS THERE IS EVIDENCE OF MALIGNANCY.